National Institute of Environmental Health Sciences

Cold and heat waves in the United States

Author(s): Barnett AG, Hajat S, Gasparrini A, Rocklov J
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Abstract:

Extreme cold and heat waves, characterized by a number of cold or hot days in succession, place a strain on people's cardiovascular and respiratory systems. The increase in deaths due to these waves may be greater than that predicted by extreme temperatures alone. We examined cold and heat waves in 99 US cities for 14 years (1987-2000) and investigated how the risk of death depended on the temperature threshold used to define a wave, and a wave's timing, duration and intensity. We defined cold and heat waves using temperatures above and below cold and heat thresholds for two or more days. We tried five cold thresholds using the first to fifth percentiles of temperature, and five heat thresholds using the 95-99 percentiles. The extra wave effects were estimated using a two-stage model to ensure that their effects were estimated after removing the general effects of temperature. The increases in deaths associated with cold waves were generally small and not statistically significant, and there was even evidence of a decreased risk during the coldest waves. Heat waves generally increased the risk of death, particularly for the hottest heat threshold. Cold waves of a colder intensity or longer duration were not more dangerous. Cold waves earlier in the cool season were more dangerous, as were heat waves earlier in the warm season. In general there was no increased risk of death during cold waves above the known increased risk associated with cold temperatures. Cold or heat waves earlier in the cool or warm season may be more dangerous because of a build up in the susceptible pool or a lack of preparedness for extreme temperatures.

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Resource Description

Exposure :

weather or climate related pathway by which climate change affects health

Temperature

Temperature: Extreme Cold, Extreme Heat

Geographic Feature:

resource focuses on specific type of geography

None or Unspecified

Geographic Location:

resource focuses on specific location

United States

Health Impact: ☑

specification of health effect or disease related to climate change exposure

Cardiovascular Effect, Injury, Respiratory Effect

Mitigation/Adaptation: ☑

mitigation or adaptation strategy is a focus of resource

Adaptation

Population of Concern: A focus of content

Population of Concern: ☑

populations at particular risk or vulnerability to climate change impacts

Elderly

Resource Type: ☑

format or standard characteristic of resource

Research Article

Timescale: ☑

time period studied

Time Scale Unspecified

Vulnerability/Impact Assessment: ☑

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

A focus of content